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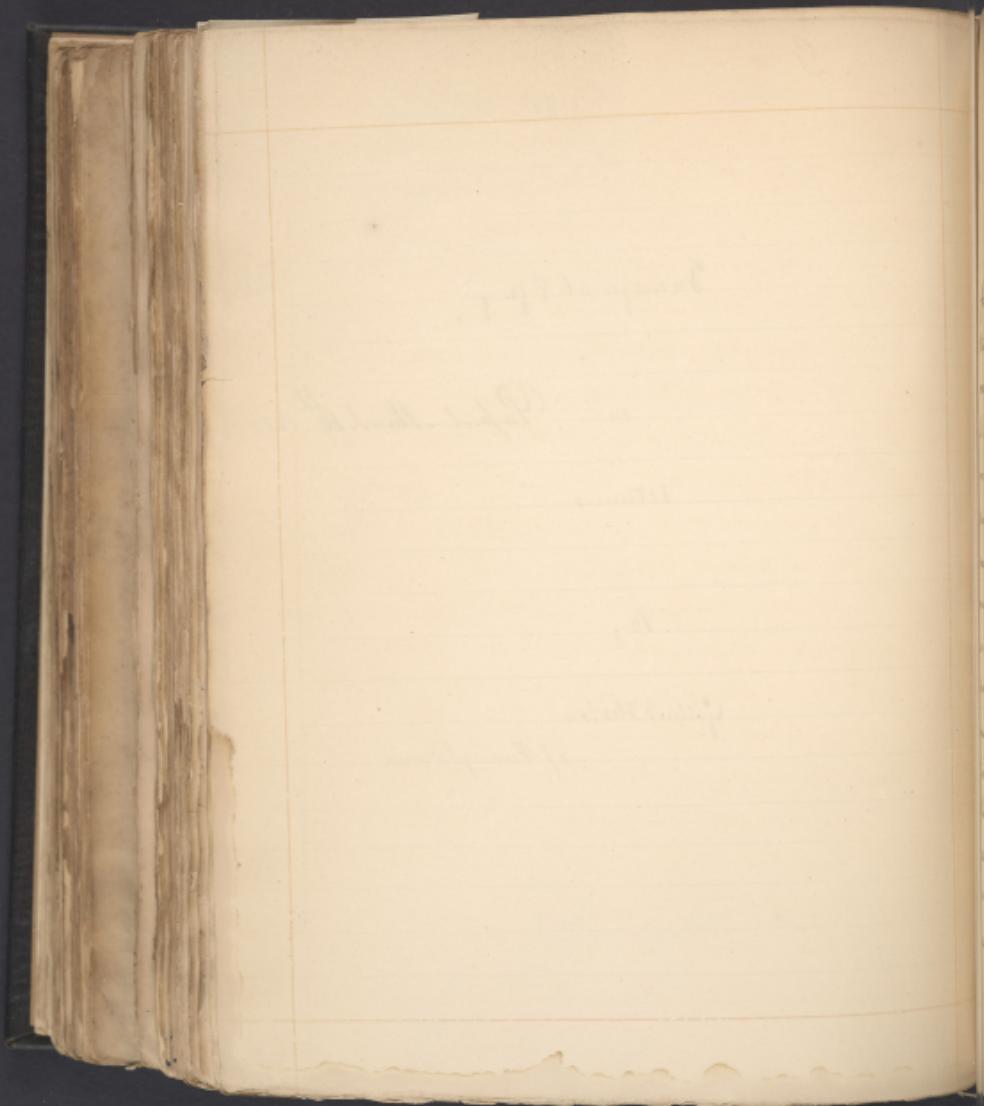
Inaugural Essay

on Paped March 19<sup>th</sup> 1825

Setanus

By

Gilliat Weston  
of Pennsylvania



## Inaugural Essay

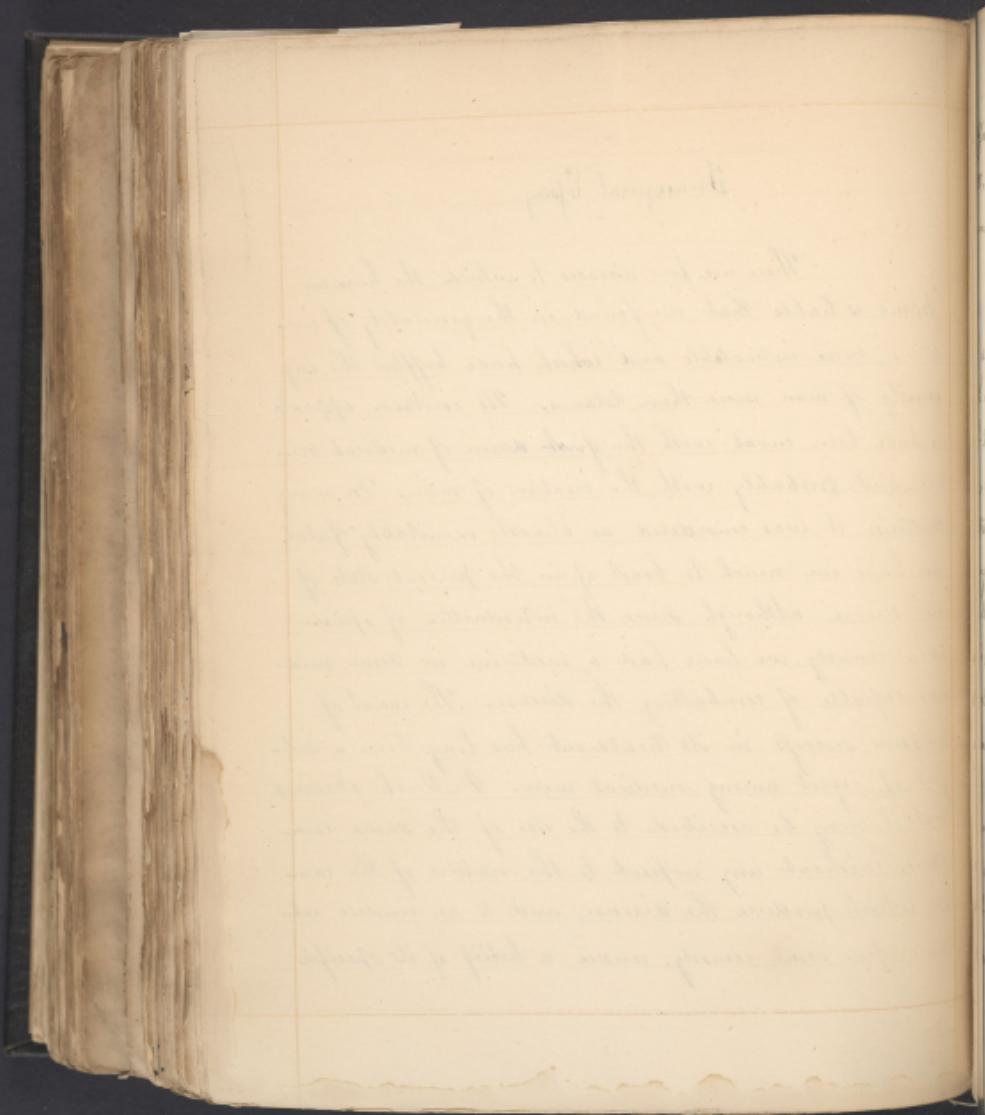
There are few diseases to which the human frame is liable that are found in the generality of instances more intractable and which have baffled the ingenuity of man more than tetanus. Its existence appears to have been coeval with the first dawn of medical science and probably with the creation of man. For many centuries it was considered as almost inevitably fatal, no have we much to boast of in the present state of our science, although since the introduction of opium as a remedy we have had a medicine in some measure capable of combatting the disease. The want of uniform success in its treatment has long been a subject of regret among medical men. Dr. Hush observes that it may be ascribed to the use of the same remedies, without any respect to the nature of the causes which produce the disease, and to an undue reliance upon some remedy, under a belief of its specific



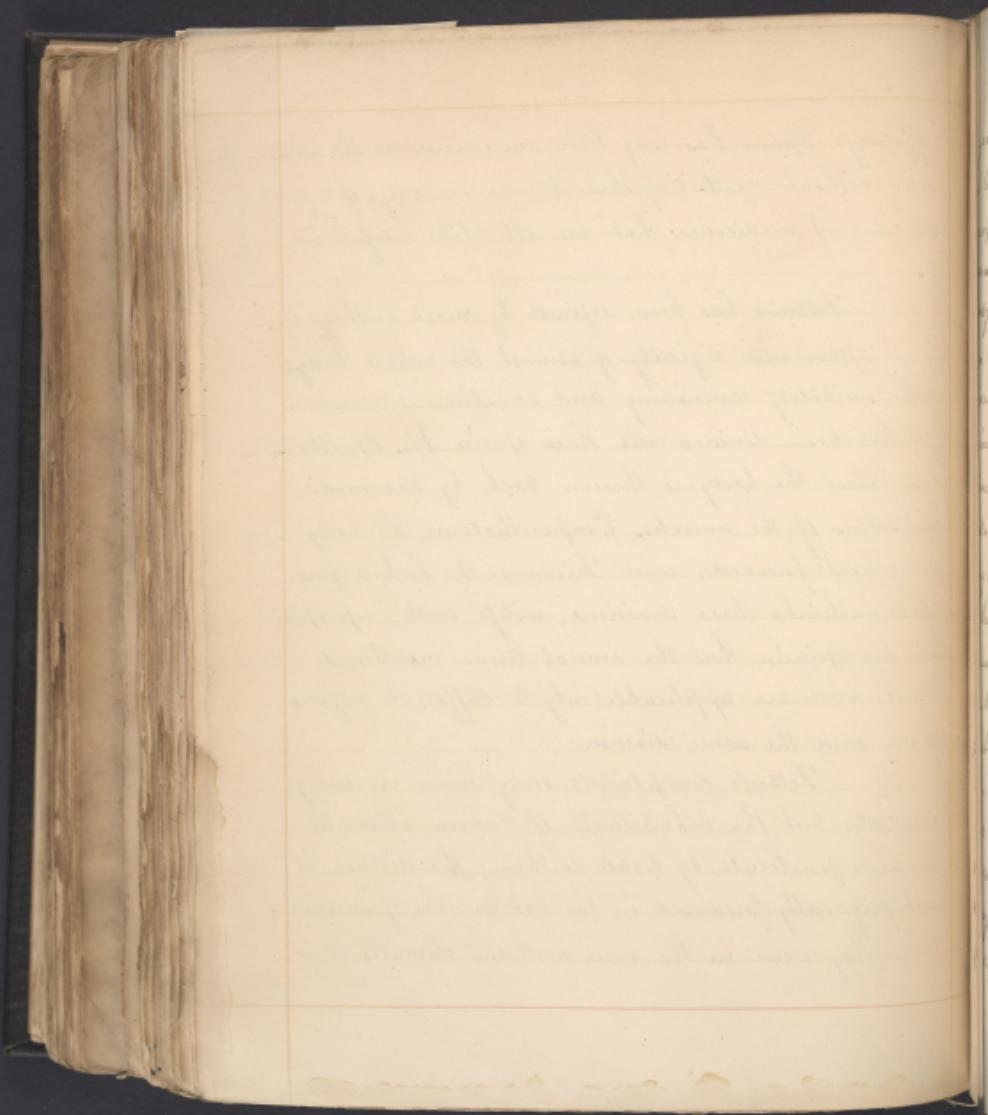
efficacy. Opium has long been considered as its antidote, without recollecting that it was one only, of a great number of medicines, that are all alike useful in it.

Tetanus has been defined by most authors to be a spasmotic rigidity of almost the whole body; with sensibility remaining and sometimes increased. It has been divided into three species Viz. Opisthotonus, where the body is thrown back by spasmotic contraction of the muscles, Emphoxitonos, the body being bent forwards, and Trismus, the locked jaw. Bullen thinks these divisions useless and improper; it is his opinion that the several terms mentioned denote, and are applicable only to different degrees of one and the same disease.

Tetanic complaints may occur in every climate; but the inhabitants of warm climates are more particularly liable to them; the disease is most frequently produced in the hot months of summer. When they occur in the more northern climates it is

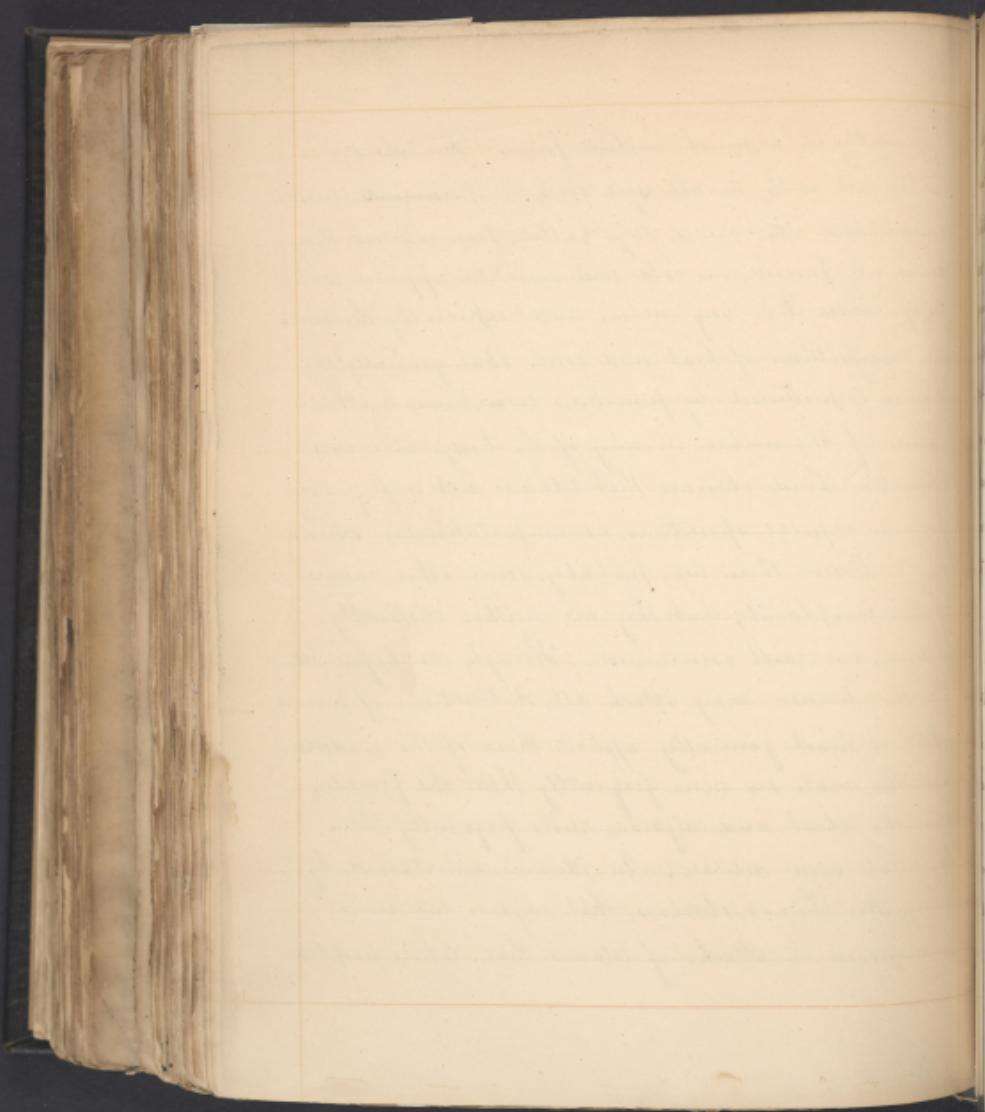


generally in a much milder form. This disease is to be met with in all ages, sexes, temperaments, and complexions. The causes, says Cullen, from whence they commonly proceed, are cold and moisture applied to the body while it is very warm, and especially the sudden vicissitudes of heat and cold. But generally the disease is produced by punctuous lacerations, or other lesions of the nerves in any of the body; in warm climates Lind observes that tetanus not unfrequently follows capital operations, as amputation &c, according to Cullen there are, probably, some other causes of this complaint; but they are neither distinctly known, nor well ascertained. Though as before stated, the disease may attack all, distinctions of persons; but it most generally afflicts those of the middle age, the male sex more frequently than the female, and the robust and vigorous more frequently than the weak and delicate. An idea is entertained by many, Mr. Thomas observes, that negroes are more predisposed to attacks of tetanus than white people;



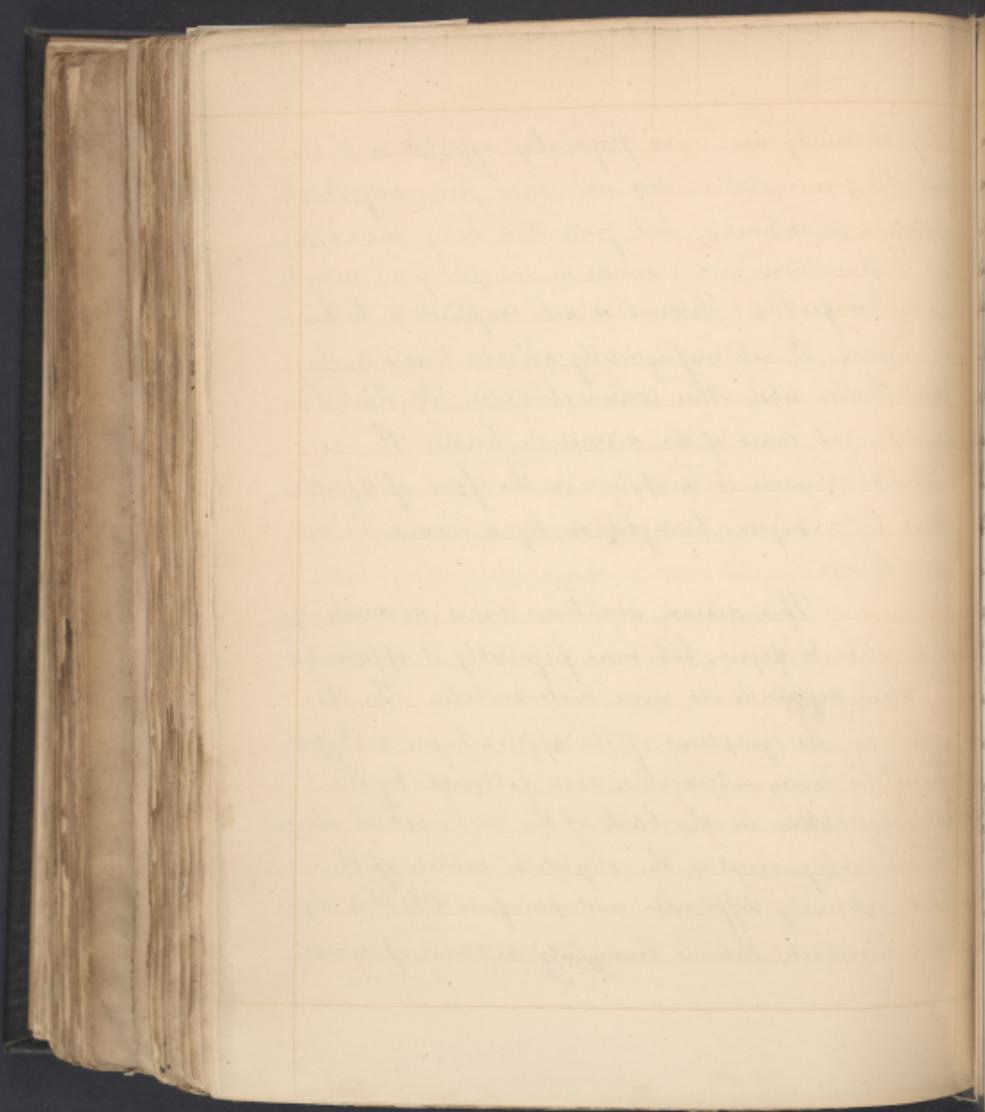
They certainly are more frequently affected with it, but this circumstance does not arise from any constitutional predisposition but from their being more exposed to punctures and wounds in the feet from usually going barefooted. Tetanus is not confined to the human species. It not unfrequently attacks horses in the West Indies and other warm climates. Dr. Rush has seen several cases of the disease in horses. He has likewise known it to appear in the form of Opisthotonus in a pigeon, brought on by a wound in one of its wings.

This disease sometimes comes on suddenly to a violent degree, but more frequently it approaches by slow degrees to its more violent state. In the latter case the symptoms of its approach are a stiffness in the lower extremities, soon followed by the same sensation in the back of the neck, which slowly increasing, renders the slightest motion of the head extremely difficult and painful. As this rigidity increases, there is commonly a sense of uneas-



ings felt about the root of the tongue, together with some difficulty of swallowing, and a great tightness is complained of about the chest, with a pain at the lower extremity of the sternum, shooting into the back. A stiffness likewise soon begins to take place in the jaws, which speedily augments to such a degree, that the teeth become so closely and firmly set together as not to admit of the smallest opening. This is what is commonly called the locked jaw. At this period of the disease, the pain at the extremity of the sternum returns very frequently; the spasms of the back of the neck are also renewed with great violence and pain. As the disease advances, a greater number of muscles become affected, with spasms. The muscles of the spine are often violently affected, so as to draw the trunk of the body very forcibly backwards.

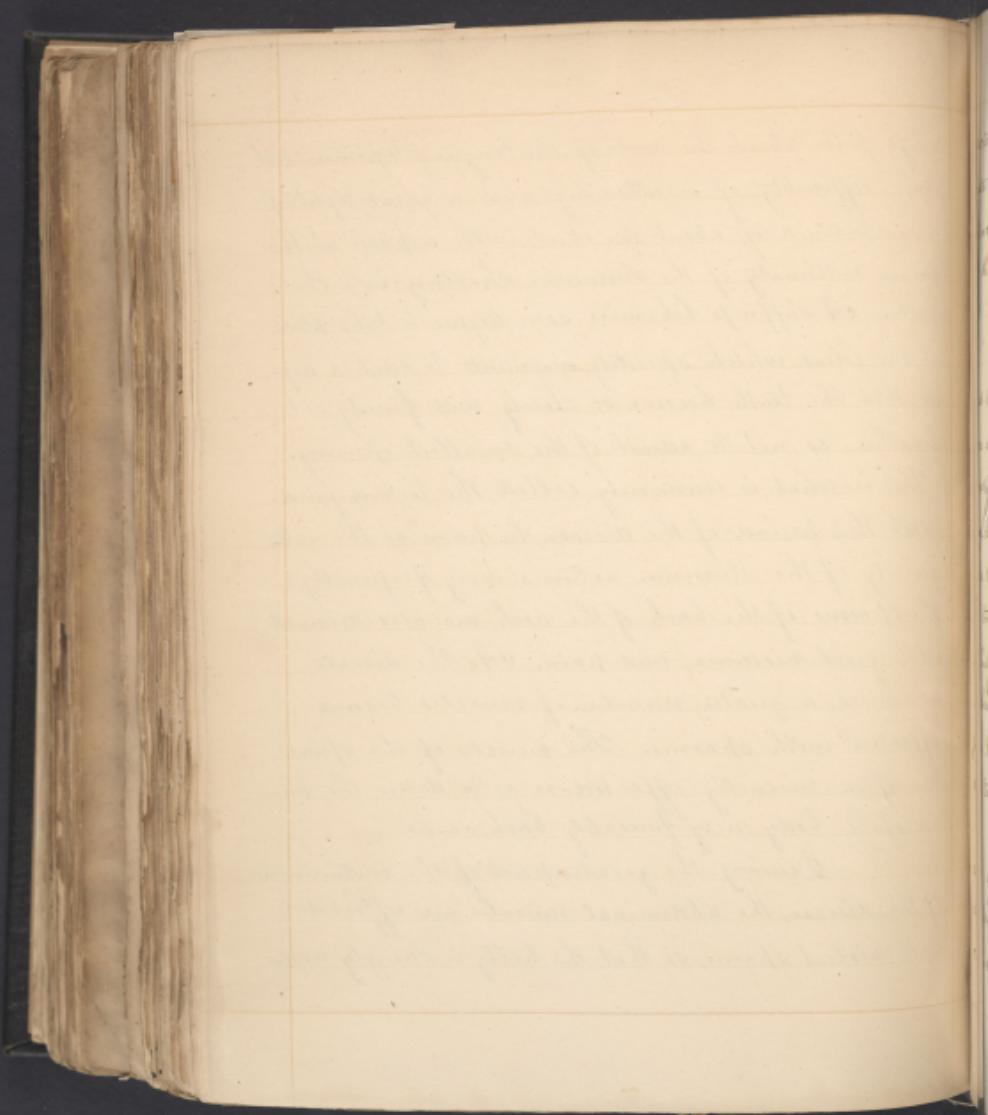
During the greater part of the continuance of the disease, the abdominal muscles are affected with violent spasm, so that the belly is strongly re-



acted and feels exceedingly hard, most frequently obstinate constipation prevails, and both the extensors and flexors of the inferior extremities are commonly affected at the same time so as to keep the limbs rigidly extended.

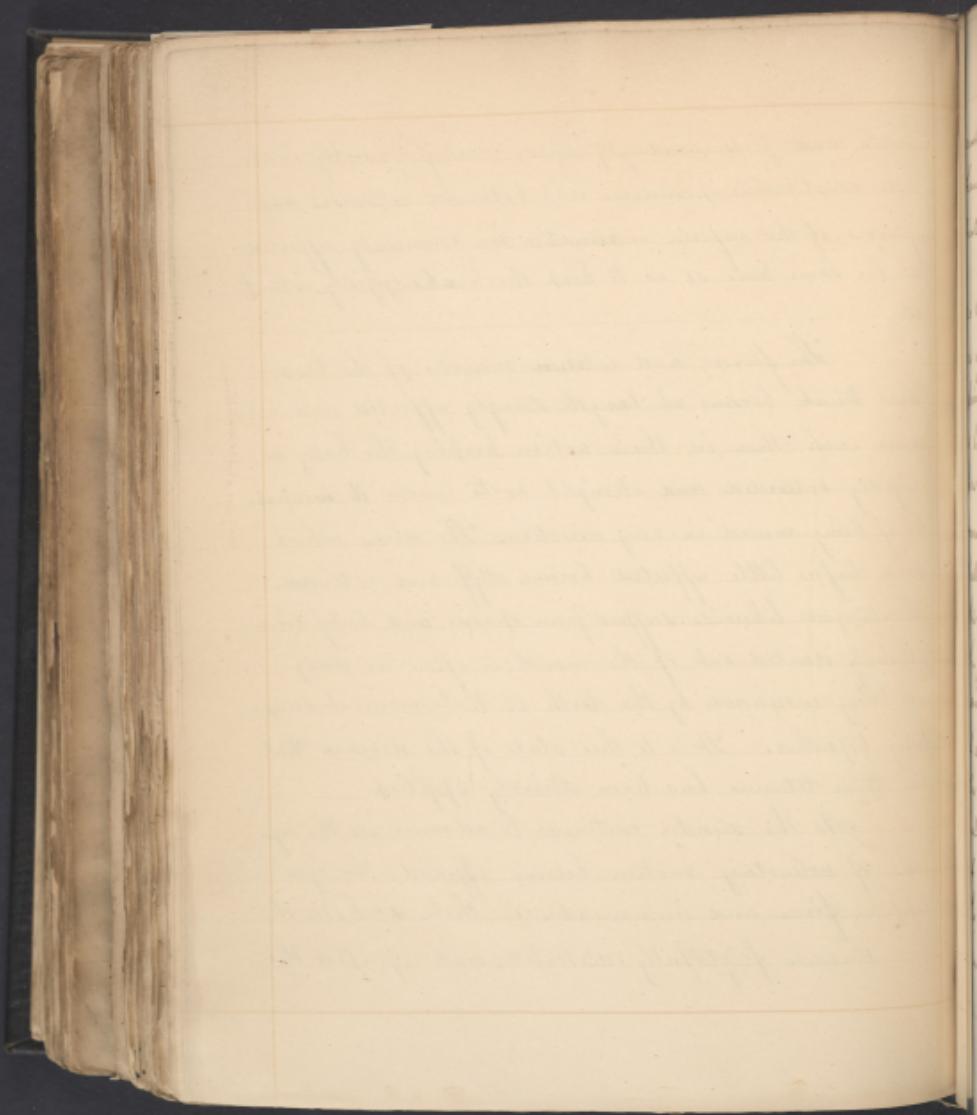
The flexor and extensor muscles of the head and trunk become at length strongly affected and balance each other in their action keeping the body so rigidly extended and straight as to render it incapable of being moved in any direction. The arms which were before little affected become stiff and extended, the tongue likewise suffers from spasm, and being convulsively darted out of the mouth, is often in danger of being wounded, by the teeth at that moment snapping together. It is to this state of the disease that the term tetanus has been strictly applied.

As the disorder continues to advance all the organs of voluntary motion become affected, the eyes appear firm and immovable in their sockets, the countenance frightfully distorted, and expulses the



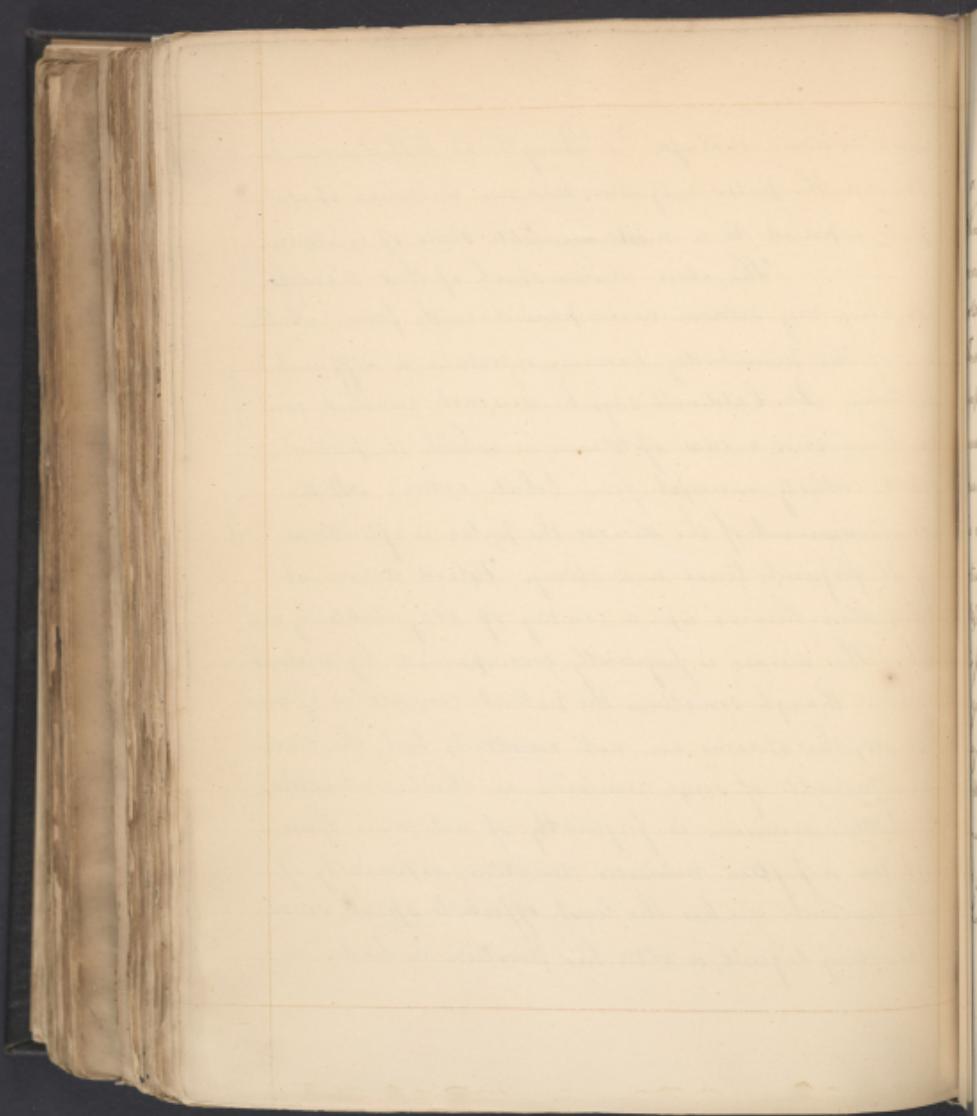
most extreme distress, the strength at last becomes exhausted. The pulse irregular, and one universal spasm puts a period to a most miserable state of existence.

The older writers speak of this disease as being very seldom accompanied with fever. Authors of the present day however entertain a different opinion. Dr. Caldwell says he does not recollect ever to have seen a case of tetanus, in which the patient was entirely exempt from febrile action. At the commencement of the disease the pulse is oftentimes full frequent, tense and strong. Blood drawn at this time throws up a coating of coagulable lymph. The disease is frequently accompanied by violent pain. Though sometimes the patient complains of none at all, the spasms are not constant, but the muscles admit of some remission in their contraction, but this remission is frequently of not more than of ten or fifteen minutes duration, especially if the patient makes the least effort to speak, swallow any liquid, or alter his position in bed.



When the complaint arises from a fracture or other injury, it most generally proves fatal. Dr. Thomas says he never met with but one case that recovered under such circumstances, during a very intensive practice and long residence in the West Indies. The locked jaw arising in consequence of amputation or a gunshot wound, likewise proves usually fatal. When these affections arise in consequence of an exposure to cold, they may in most cases be removed by a timely use of proper remedies, notwithstanding a considerable space will probably elapse before the patient will be able to regain his former strength. Although there is sometimes a great abatement in the spasms of tetanus, still they are apt to return with renovated force, and on this account we should be careful how we pronounce our patient out of danger. In some cases, the patient is destroyed in four or five days in others, he may linger for two weeks.

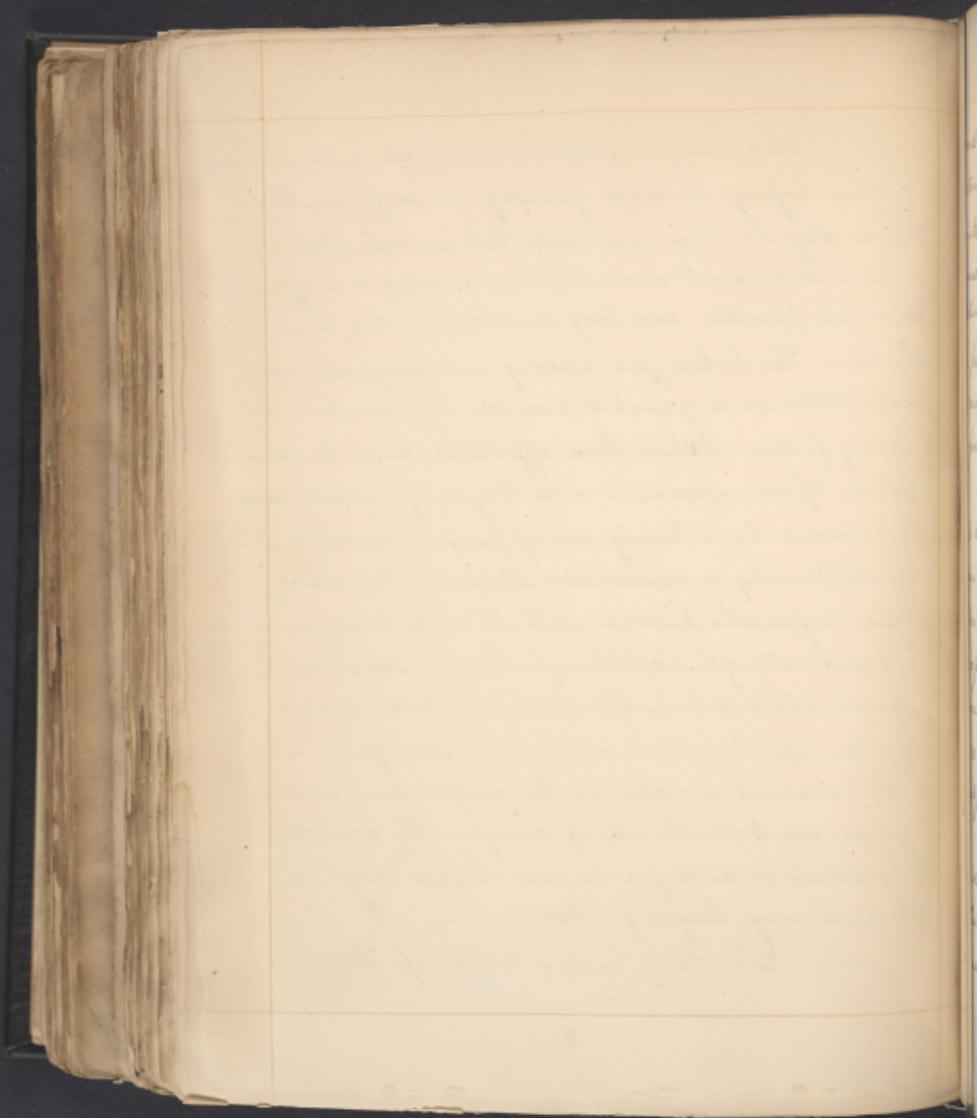
Dr. Parry in his cases of Tetanus



and Rabies-Contagiosa, has made the following important remark, that if in an adult, the pulse by the fourth day does not reach one hundred or perhaps one hundred and ten beats in a minute, he believes the patient almost always recovers; if on the other hand, the pulse on the first day is one hundred and twenty or more in a minute, few instances, he apprehends, will be found in which he will not die.

The first induction in the treatment of this disease, is to endeavour to find out the cause from which it originates. If supposed to proceed from a wound or puncture, the injured part ought carefully to be examined, and any extraneous substance that may have lodged therein, should be extracted, taking care at the same time to dilate and fully lay open the wound.

Advantage has sometimes been derived from pouring a small quantity of a strong solution of opium into the wound, drying it afterwards with lint dipped in the same, and laying

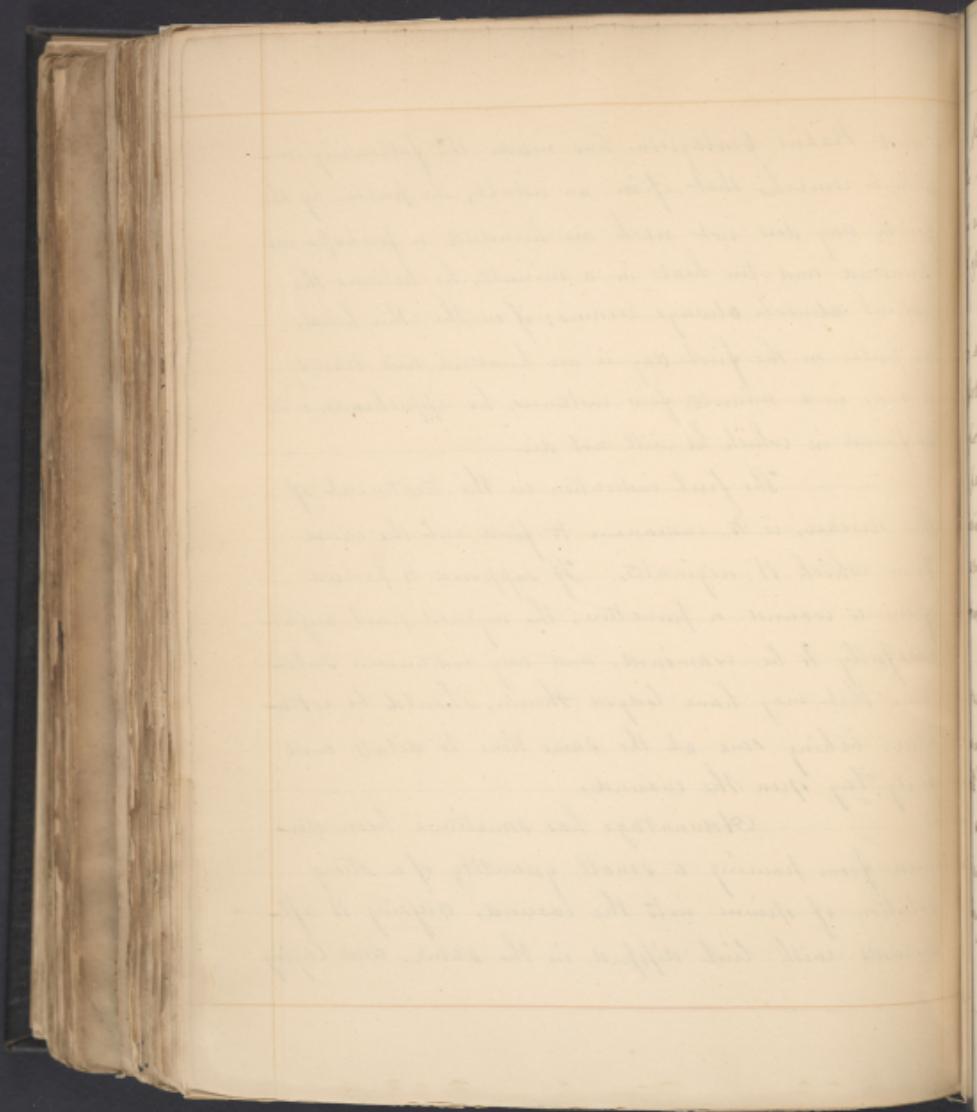


a pledget spread with digestive ointments over the whole. Every time the dressings are renewed, the wound is again to be wetted with the solution of opium.

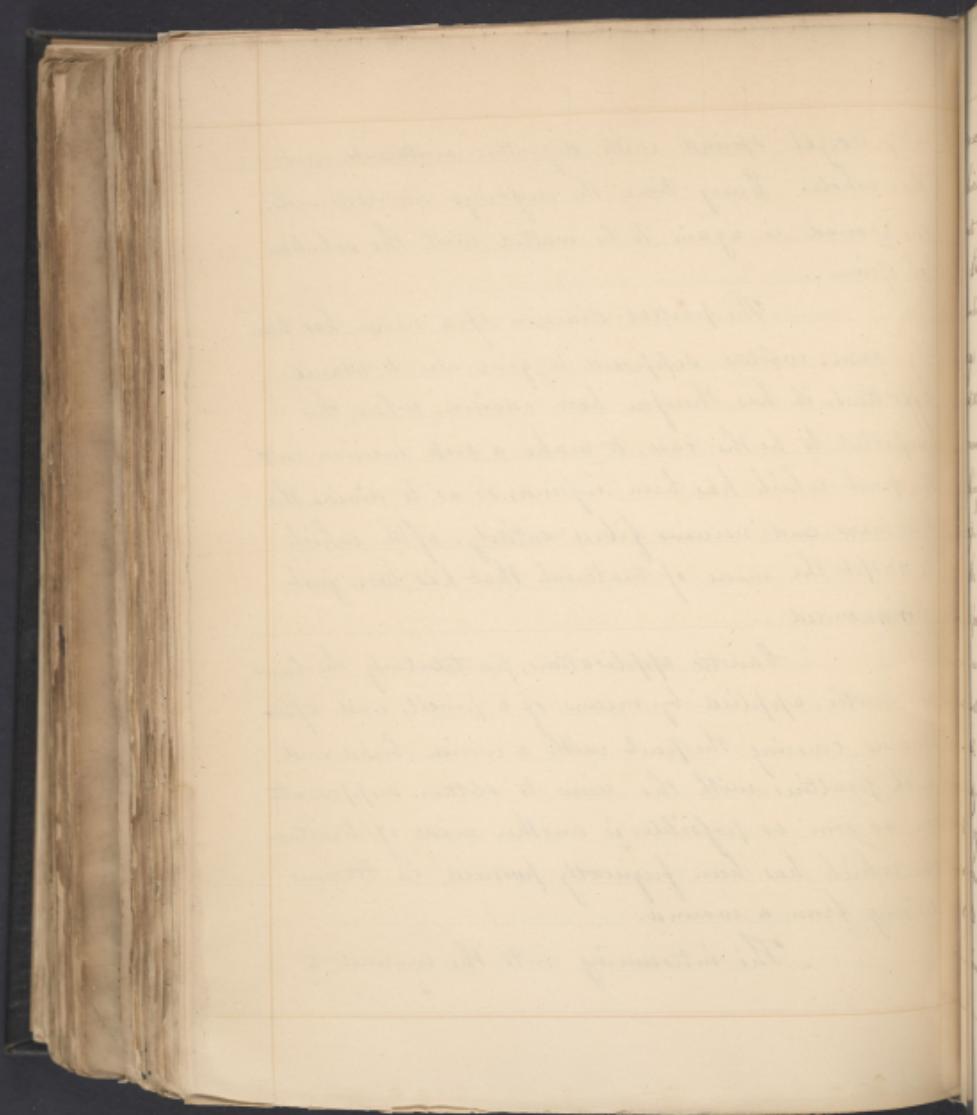
The partial division of a nerve has been by some writers supposed to give rise to tetanic affections, it has therefore been advised, when this is suspected to be the case, to make a deep incision into the part which has been injured, so as to divide the tendinous and nervous fibres entirely, after which to adopt the mode of treatment that has been just recommended.

Caustic applications, particularly the lana caustic applied by means of a pencil, and afterwards covering the part with a warm bread and milk poultice, with the view to obtain suppuration as soon as possible, is another mode of treatment which has been frequently pursued in tetanus arising from a wound.

The introducing into the wound a



small piece of lint wet with spirits of turpentine,  
which soon brings on inflammation, and thereby pre-  
vents or cures the convulsions, has been recommended  
by Darwin. Mr. Stevenson of Baltimore in the third  
number of the *Advocacy Medical and Physical Journal*,  
page 220, gives the following account of a case  
treated in this manner. A stout, heavy, black  
woman, aged about thirty-five or forty years, in  
walking barefoot chanced to tread upon a piece of  
stap, which wounded her foot near the first joint  
of the little toe. It bled copiously, and no attention  
was paid to it. At the expiration of three weeks  
she was suddenly seized with a spasm in the  
muscles of the lower jaw, accompanied with intoler-  
able pain, particularly near the coronoid and  
wavy-laid processes. This, in spite of large quanti-  
ties of opium, increased, and a rigidity of the low-  
er jaw superseded to such an extent that she  
could not masticate her food. Two grains of  
opium were given every two hours without any



alleviation of the symptoms. In this dreadful state the doctor made an incision about half an inch deep, and an inch and a half in length, immediately above the cicatrix, in a transverse direction, and then poured strong spirits of turpentine into the wound. In a few minutes violent pain was created in the part; in half an hour the spasms left the jaw; and in a few hours more the rigidity entirely vanished. The pain in the wound became excessive, and continued so far four or five hours; but the trismus was completely removed, nor did it afterwards recur. Little or no suppuration ensued. The wound healing by the first intention, or adhesive inflammation.

There is perhaps no remedy which has been employed with greater success in this disease than opium used internally; it should be given in doses graduated according to the urgency of the case. Dr Caldwell says as far as the experience of the physicians of Philadelphia



enables him to speak, opium, wine, and mercury appear to be the only remedies on which any reliance can be placed in the treatment of tetanus. Of these, the two former retard the progress of the disease, preventing exhaustion and death, from the violence of the spasms until the latter has had time to eradicate it entirely, by converting the tetanic into the mercurial action. Opium and wine, being in their natures, rather palliative than curative remedies, are insufficient of themselves, without mercury; while, without their aid, mercury is too slow in its operation to arrest the rapid march of the disease. Some of the most celebrated surgeons of the present day, however, place implicit confidence in opium and make use of no other remedy.

It has been Dr. Physicks practice — and higher authority cannot be cited — to give opium in injections, in doses of from five to eight grains, frequently repeated, until the

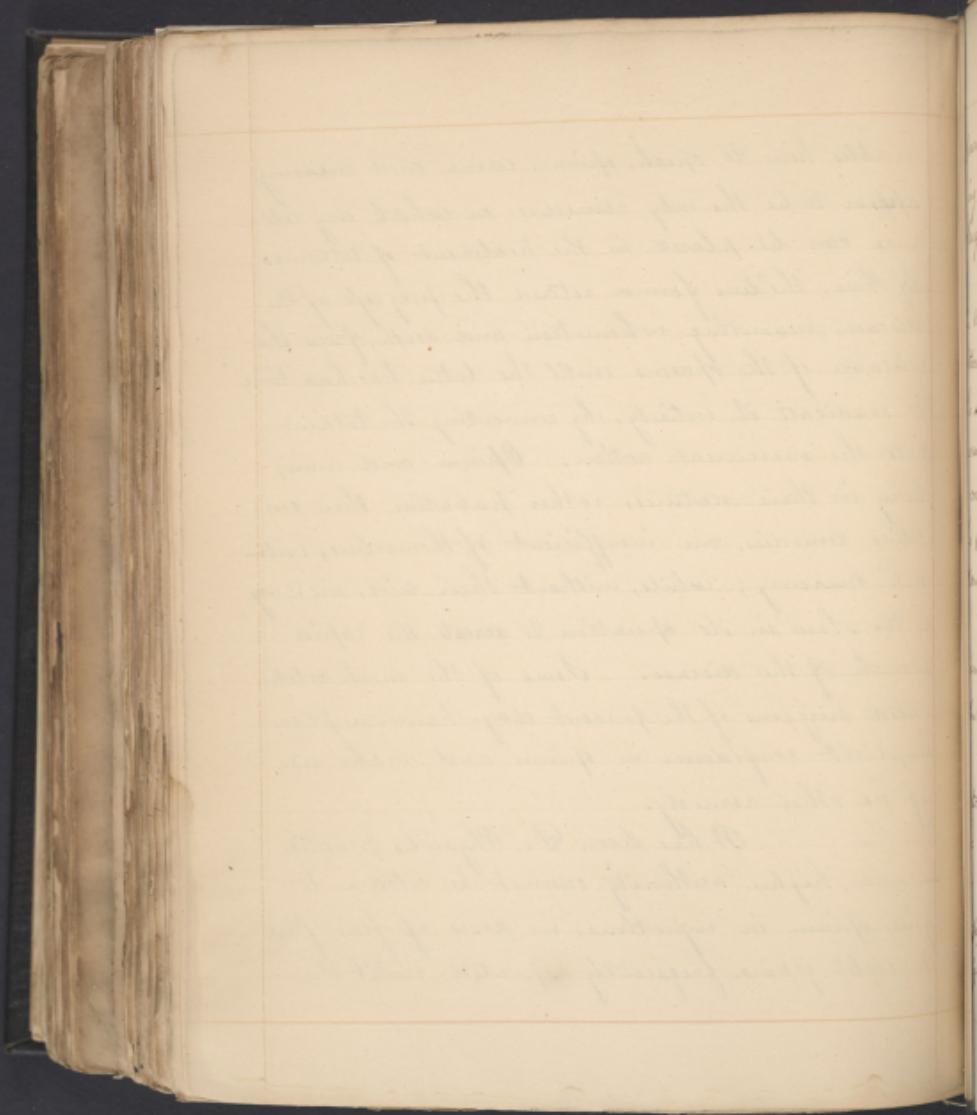
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spasms be overcome, and stupor induced; applying, in the meantime, to different parts of the body, large quantities of mercurial ointment.

The spasms being subdued, he relaxes in the use of opium, until they manifest a disposition to return; when he immediately recurs to the same remedy, and in similar doses. In the meantime, the application of the mercurial ointment is continued, until a ptyalism be produced; when the patient is considered in some measure out of danger.

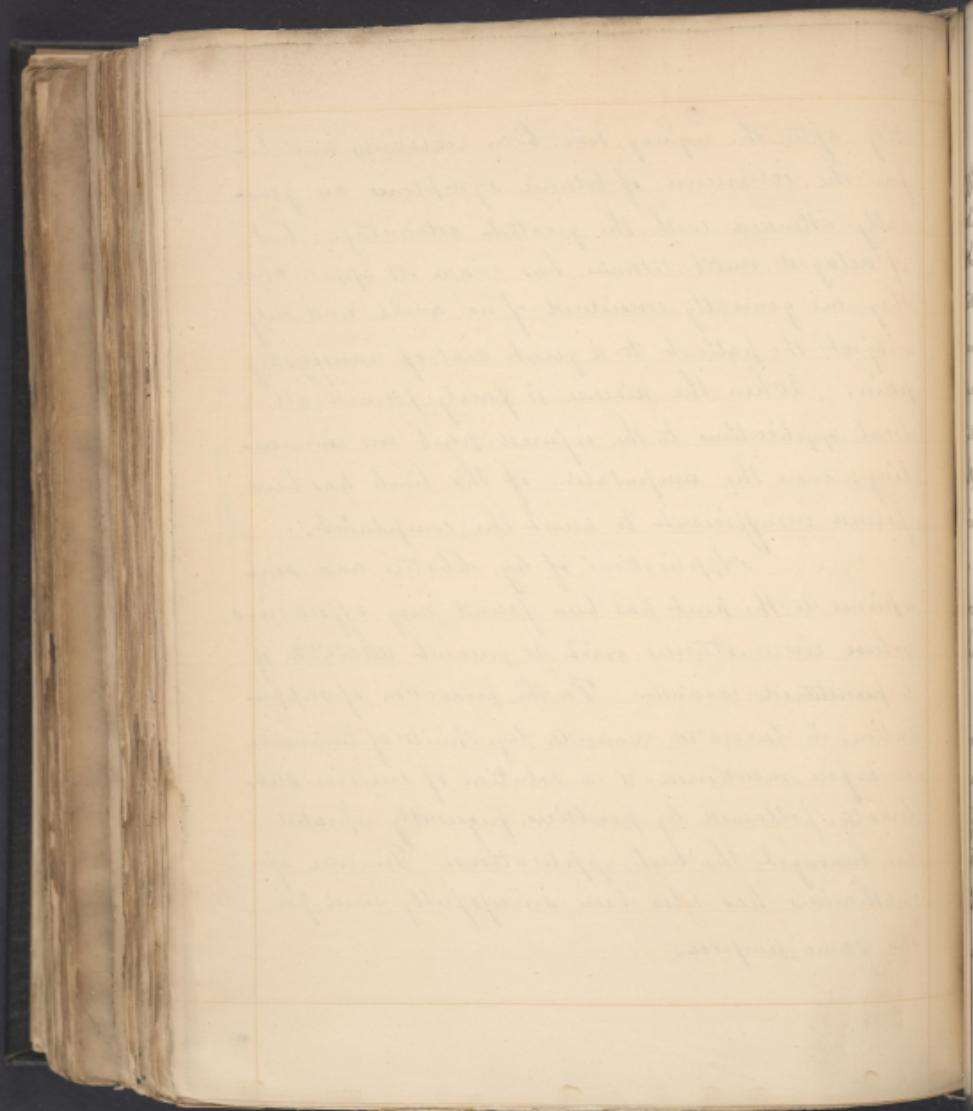
Dr. Thomas observes that he never found the mercurial plan of treatment to answer, but confesses that he very seldom tried it.

Amongst the preventives of tetanus, from external injuries, and probably one of the best, is the emulsion of punctured into incised wounds, by means of the scalpel; and the excitement of suppuration in lacinated wounds is also considered highly beneficial. These things are done immedia-



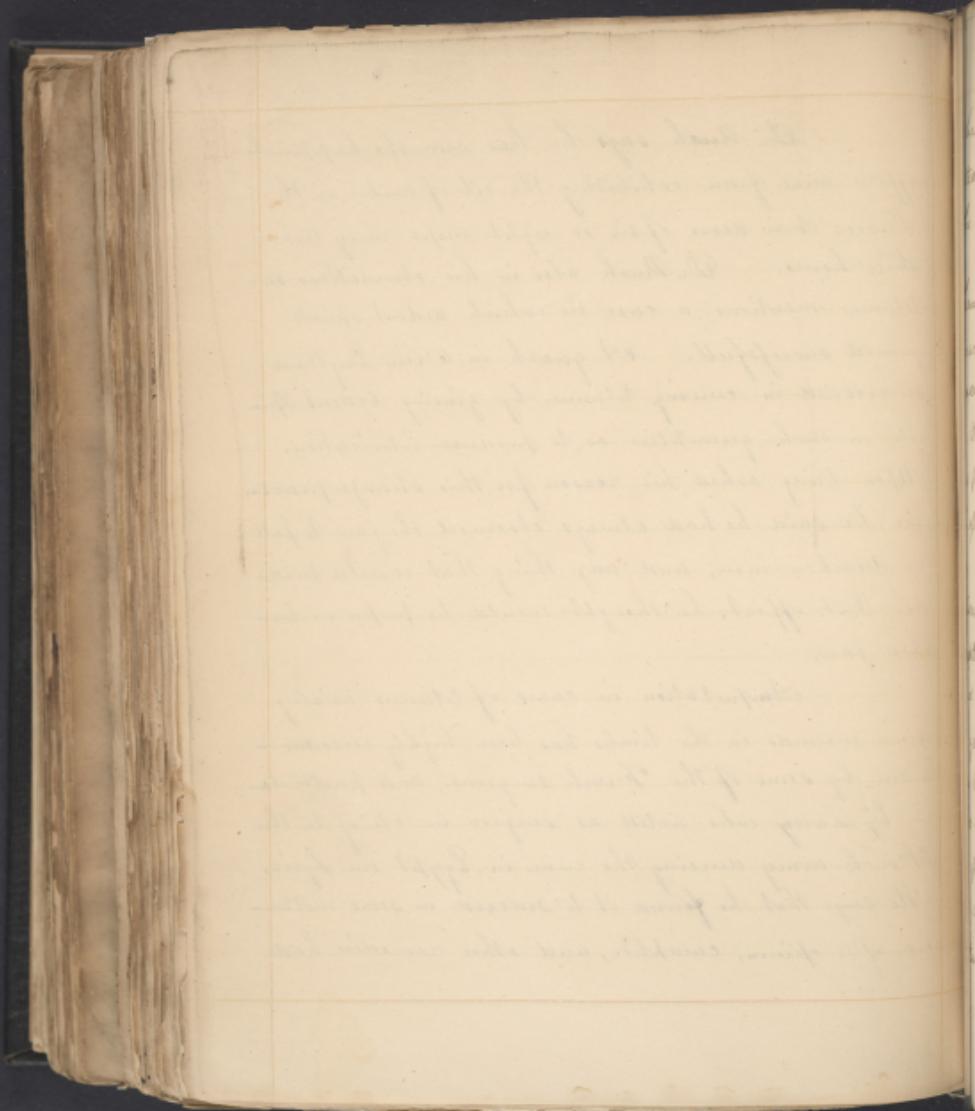
tily after the injury has been received, and before the occurrence of tetanic symptoms are generally attended with the greatest advantage; but if delayed until tetanus has made its appearance they are generally considered of no avail, and only subject the patient to a great deal of unnecessary pain. When the disease is fairly formed, all local applications to the injured part are unavailing: even the amputation of the limb has been found insufficient to arrest the complaint.

Applications of dry blisters and dressings to the part has been found very efficacious where circumstances exist to prevent dilatation of a purulated wound. For the production of suppuration, in lacerated wounds, try. Spirits of turpentine as before mentioned, or a solution of corrosive sublimate, followed by poultices, frequently repeated are amongst the best applications. Tincture of cantharidus has also been successfully used for the same purpose.



Dr. Rush says he has seen the happiest effects arise from exhibiting the oil of amber in this disease; it in doses of six or eight draps every two or three hours. Dr. Rush also in his observations on tetanus mentions a case in which ardent spirits proved successfull. A quack in New England succeeded in curing tetanus, by giving ardent spirits in such quantities as to produce intoxication. Upon being asked his reason for this strange practice he said he had always observed the jaw to fall in drunken men, and any thing that would produce that effect, he thought would be proper in locked jaw.

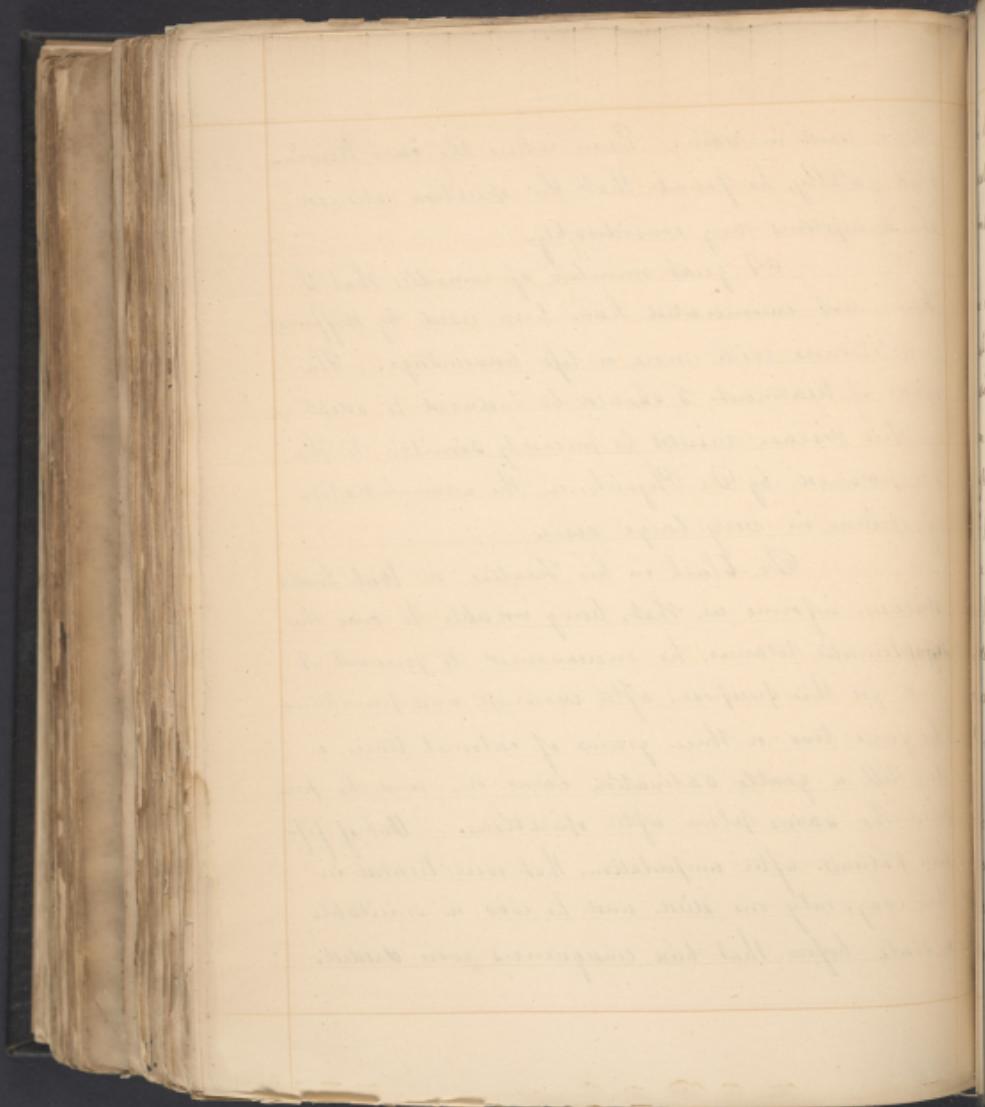
Amputation in cases of tetanus arising from wounds in the limbs has been highly recommended by some of the French surgeons, and particularly by Larrey who acted as surgeon-in-chief to the French army during the war in Egypt and Syria. He says that he found it to succeed in some instances after opium, camphor, and other remedies had



been used in vain. Even where the case terminated fatally, he found that the operation relieved the symptoms very considerably.

A great number of remedies that I have not enumerated have been used by different practitioners with more or less advantage. The mode of treatment I should be induced to adopt in this disease would be precisely similar to the one pursued by Dr Physick, or the administration of opium in very large doses.

Dr Clark in his Treatise on West India diseases, informs us, that, being unable to cure the symptomatic tetanus, he endeavoured to prevent it and for this purpose, after evacuons, and punctures, he gave two or three grains of calomel twice a day till a gentle salivation came on, and he pursued the same plan after operations. Out of fifteen patients, after amputation, that were treated in this way, only one died, and he was in so irritable a state before that bad consequences were dreaded.



In those who had been wounded, the success was  
greater; two only having been lost out of a great  
number, since this mode of practice was commenced.

That this mode of prevention is not proper in the West Indies I shall not pretend to say,  
but certainly it would not be considered the most  
judicious practice in this country to excite a ptya-  
lism in every case of punctured wound, or after  
amputation. I understand it is almost a univer-  
sal practice on board ships of war, to mix a nine-  
tine of opium with the dressings, and that since  
the practice has been adopted, these complaints  
seldom occur. As a preventive, I should be  
much inclined to prefer it to that proposed by  
Dr Clark.

Dissections of persons dying of this dis-  
ease have cast but little light upon it, slight  
effusions within the cranium have been observed  
in a few instances; but in by far the greater nu-  
mber nothing particular has been discovered either



in the brain or any other organ. In some instances however the blood is not found to coagulate, but fluid like molasses as in persons killed by lightning, appearing to indicate that the whole muscular fibres of the arterial system had partaken of the general spasmodic action. The nerves have also been examined after death, from the place of injury to their cerebral termination, but no inflammation has been observed in any part of their course: The supposition therefore that an inflamed nerve is the cause of the disease is unfounded.

Engdell

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